

GCSE Mathematics

Revision Pack

OCR GCSE Mathematics (J560)

Foundation & Higher tier · Version 1

Top-10 most frequently examined topics, ranked from
past-paper frequency analysis (2018–2024 series):
key facts · 30 original practice questions
fully worked solutions

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All questions and solutions are original Apex materials.

How to use this pack

This pack covers the **ten most frequently examined topics** on the OCR GCSE Maths specification, ranked from an analysis of Ofqual strand weightings and published past-paper frequency studies of recent exam series (2018–2024). It supports both **Foundation** and **Higher** tier students; every question is labelled with the tier it suits.

- 1. Diagnose first.** Attempt the three questions in each section before reading the worked solutions. Mark honestly.
- 2. Target your gaps.** The frequency table overleaf shows the ranking: 'revise-first' topics appear on virtually every paper — master these before rarer topics.
- 3. Learn the facts box.** Each section opens with the key facts and formulas the examiners expect you to recall instantly.
- 4. Study the solutions.** Worked solutions show the method marks — write your answers the same way, with reasons and checks.
- 5. Repeat.** Return to any section you found difficult after one week. Spaced practice is what moves grades.

Board guidance: OCR places visible weight on number fluency, exact values and mathematical reasoning — 'show that' and 'explain your answer' prompts are common. Accuracy with fractions and standard form is repeatedly rewarded, and OCR examiners comment that candidates lose marks through premature rounding and missing units.

Questions marked F suit both tiers; H questions are Higher-only content or difficulty. All content in this pack is original to Apex Academic Consultancy.

OCR topic frequency — top 15

Ranked from Ofqual strand weightings and past-paper frequency analysis. Exact counts vary slightly by series; use the priority column to plan revision.

#	Topic	Tier	Marks	Priority
1	Fractions, decimals and percentages ★	F & H	5–10	revise-first
2	Solving linear equations ★	F & H	4–8	revise-first
3	Ratio and proportion ★	F & H	4–8	revise-first
4	Area and perimeter ★	F & H	4–6	revise-first
5	Sequences and the nth term ★	F & H	3–5	revise-first
6	Angles in lines and polygons ★	F & H	3–5	high
7	Probability and tree diagrams ★	F & H	4–7	high
8	Straight-line and quadratic graphs ★	F & H	4–6	high
9	Percentage change, compound growth and reverse percentages ★	F & H	3–6	high
10	Standard form ★	F & H	2–4	high
11	Pythagoras' theorem	F & H	3–5	high
12	Trigonometry (SOH CAH TOA)	H	3–5	high
13	Quadratic equations and graphs	H	4–8	high
14	Simultaneous equations	F & H	3–5	medium
15	Bounds and error intervals	H	2–4	medium

★ = covered in detail in this pack (top 10). Ranks 11–15 are covered in the full Apex revision series.

1. Fractions, decimals and percentages

Frequency rank 1 of 15 · Strand: Number · Typical marks per paper: 5–10 · Priority: revise-first

KEY FACTS & FORMULAS

- Add/subtract fractions with a common denominator; multiply tops and bottoms for multiplication.
- Divide by a fraction: multiply by its reciprocal (keep-change-flip).
- Percentage of an amount: convert to a decimal multiplier (e.g. 45% → 0.45) and multiply.
- Fraction → decimal: divide numerator by denominator; decimal → percentage: $\times 100$.
- Recurring decimals and exact fractions keep answers accurate — avoid premature rounding.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Work out $\frac{3}{4} + \frac{2}{5}$, giving your answer as a mixed number.

Worked solution. Common denominator 20: $\frac{15}{20} + \frac{8}{20} = \frac{23}{20} = 1 \frac{3}{20}$.

Q2 [F · Standard] Increase £240 by 15%.

Worked solution. Multiplier = 1.15. $240 \times 1.15 = £276$.

Q3 [H · Challenge] A jacket priced £80 is reduced by 20% in a sale, then a further 10% is taken off the sale price. Find the final price and the single equivalent percentage reduction.

Worked solution. $80 \times 0.8 = £64$; $64 \times 0.9 = £57.60$. Combined multiplier $0.8 \times 0.9 = 0.72$, so the single equivalent reduction is 28%.

2. Solving linear equations

Frequency rank 2 of 15 · Strand: Algebra · Typical marks per paper: 4–8 · Priority: revise-first

KEY FACTS & FORMULAS

- Keep the equation balanced: do the same operation to both sides.
- Expand brackets first, then collect like terms.
- Unknown on both sides: collect all x terms on one side, numbers on the other.
- Fractions: multiply every term by the denominator to clear them.
- Always check by substituting your answer back into the original equation.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Solve $3x + 7 = 22$.

Worked solution. $3x = 22 - 7 = 15$, so $x = 15 \div 3 = 5$. Check: $3(5) + 7 = 22$ ✓

Q2 [F/H · Standard] Solve $5(x - 2) = 3x + 8$.

Worked solution. Expand: $5x - 10 = 3x + 8$. Subtract $3x$: $2x - 10 = 8$. Add 10: $2x = 18$, so $x = 9$. Check: $5(9) = 35$ and $27 + 8 = 35$ ✓

Q3 [H · Challenge] Solve $(2x + 1)/3 = x - 2$.

Worked solution. Multiply both sides by 3: $2x + 1 = 3x - 6$. Subtract $2x$: $1 = x - 6$, so $x = 7$. Check: $(14+1)/3 = 5$ and $7 - 2 = 5$ ✓

3. Ratio and proportion

Frequency rank 3 of 15 · Strand: Ratio · Typical marks per paper: 4–8 · Priority: revise-first

KEY FACTS & FORMULAS

- Simplify ratios by dividing both parts by their highest common factor.
- To share in a ratio $a:b$, divide the total into $(a+b)$ equal parts.
- Direct proportion: if one quantity doubles, so does the other (use the unitary method).
- Write ratios as fractions to link with equations in harder problems.
- Recipes, maps (scale) and best-value questions are all ratio in disguise.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Share £84 between Amara and Ben in the ratio 3 : 4.

Worked solution. Total parts = 7, so each part is $£84 \div 7 = £12$. Amara gets $3 \times 12 = £36$; Ben gets $4 \times 12 = £48$.

Q2 [F · Standard] A recipe for 4 people uses 300 g of flour. How much flour is needed for 10 people?

Worked solution. Per person: $300 \div 4 = 75$ g. For 10 people: $75 \times 10 = 750$ g.

Q3 [H · Challenge] A bag contains red and blue counters in the ratio 2 : 5. After 12 more blue counters are added, the ratio becomes 1 : 4. How many red counters are in the bag?

Worked solution. Let red = $2k$ and blue = $5k$. Then $2k / (5k + 12) = 1/4$, so $8k = 5k + 12$ and $k = 4$. Red counters = $2 \times 4 = 8$. (Blue ends as $20 + 12 = 32$, and $8 : 32 = 1 : 4$ ✓)

4. Area and perimeter

Frequency rank 4 of 15 · Strand: Geometry · Typical marks per paper: 4–6 · Priority: revise-first

KEY FACTS & FORMULAS

- Rectangle: $A = l \times w$; triangle: $A = \frac{1}{2} \times b \times h$; parallelogram: $A = b \times h$.
- Trapezium: $A = \frac{1}{2}(a + b)h$ where a and b are the parallel sides.
- Circle: $A = \pi r^2$, circumference = $2\pi r = \pi d$.
- Compound shapes: split into simple shapes, then add or subtract areas.
- Perimeter is a length (units); area is measured in square units.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A rectangle measures 12 cm by 7.5 cm. Find its area and perimeter.

Worked solution. Area = $12 \times 7.5 = 90 \text{ cm}^2$. Perimeter = $2(12 + 7.5) = 39 \text{ cm}$.

Q2 [F/H · Standard] Find the area and circumference of a circle of radius 5 cm, giving your answers to 1 decimal place.

Worked solution. Area = $\pi \times 5^2 = 25\pi \approx 78.5 \text{ cm}^2$. Circumference = $2\pi \times 5 = 10\pi \approx 31.4 \text{ cm}$.

Q3 [F/H · Challenge] A trapezium has parallel sides 8 cm and 14 cm and height 6 cm. Find its area.

Worked solution. $A = \frac{1}{2}(8 + 14) \times 6 = \frac{1}{2} \times 22 \times 6 = 66 \text{ cm}^2$.

5. Sequences and the nth term

Frequency rank 5 of 15 · Strand: Algebra · Typical marks per paper: 3–5 · Priority: revise-first

KEY FACTS & FORMULAS

- Linear sequence: constant first difference d ; n th term = $dn + (\text{first term} - d)$.
- Geometric sequence: multiply by a constant ratio each time.
- Quadratic sequence: constant second difference of 2 means an n^2 term; compare with n^2 .
- To test whether a value is in a sequence, set the n th term equal to it — n must be a positive whole number.
- Triangular, square and Fibonacci-type sequences appear regularly in context questions.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A sequence begins 5, 9, 13, 17, ... Find the n th term and the 50th term.

Worked solution. Difference = 4, so n th term = $4n + c$. When $n = 1$, $4 + c = 5$ gives $c = 1$: n th term = $4n + 1$. 50th term = $4(50) + 1 = 201$.

Q2 [H · Standard] Find the n th term of the sequence 3, 8, 15, 24, ...

Worked solution. Second difference is constant (5, 7, 9 → differences +2), so quadratic. Comparing with n^2 (1, 4, 9, 16): each term is $2n$ more, so n th term = $n^2 + 2n$. Check: $n=4 \rightarrow 16 + 8 = 24$ ✓

Q3 [F/H · Challenge] Is 150 a term of the sequence with n th term $7n - 3$? Justify your answer.

Worked solution. Set $7n - 3 = 150$, so $7n = 153$ and $n = 153/7 = 21.857...$, which is not a whole number. So 150 is NOT in the sequence.

6. Angles in lines and polygons

Frequency rank 6 of 15 · Strand: Geometry · Typical marks per paper: 3–5 · Priority: high

KEY FACTS & FORMULAS

- Angles on a straight line sum to 180° ; around a point, 360° ; vertically opposite angles are equal.
- Parallel lines: corresponding angles equal; alternate angles equal; co-interior (allied) angles sum to 180° .
- Sum of interior angles of an n -sided polygon = $(n - 2) \times 180^\circ$.
- Exterior angles of any polygon sum to 360° ; regular polygon exterior angle = $360^\circ \div n$.
- Always give a REASON for each step in angle problems — marks are awarded for reasons.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Two parallel lines are cut by a transversal. One corresponding angle is 65° . Write down the size of the angle that corresponds to it, and the size of its co-interior partner.

Worked solution. Corresponding angle = 65° (corresponding angles are equal). Co-interior partner = $180^\circ - 65^\circ = 115^\circ$ (co-interior angles sum to 180°).

Q2 [F/H · Standard] Find the size of one interior angle of a regular octagon.

Worked solution. Sum of interior angles = $(8 - 2) \times 180^\circ = 1080^\circ$. Each interior angle = $1080^\circ \div 8 = 135^\circ$. (Or exterior angle $360^\circ \div 8 = 45^\circ$, so interior = $180^\circ - 45^\circ = 135^\circ$.)

Q3 [F/H · Challenge] The angles of a quadrilateral are $3x^\circ$, $(2x + 10)^\circ$, 90° and $(x + 50)^\circ$. Find x and all four angles.

Worked solution. Angles sum to 360° : $3x + 2x + 10 + 90 + x + 50 = 360$, so $6x + 150 = 360$ and $x = 35$. Angles: 105° , 80° , 90° , 85° . Check: $105 + 80 + 90 + 85 = 360$ ✓

7. Probability and tree diagrams

Frequency rank 7 of 15 · Strand: Probability · Typical marks per paper: 4–7 · Priority: high

KEY FACTS & FORMULAS

- Probabilities lie between 0 and 1; all outcomes sum to 1.
- $P(\text{not } A) = 1 - P(A)$.
- Tree diagrams: multiply along branches (AND), add between branches (OR).
- Independent events: $P(A \text{ and } B) = P(A) \times P(B)$.
- Without replacement, the denominators change on the second branch — a classic Higher trap.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] A bag holds 3 red, 5 blue and 2 green counters. One counter is picked at random. Find $P(\text{red})$ and $P(\text{not blue})$.

Worked solution. Total = 10. $P(\text{red}) = 3/10$. $P(\text{not blue}) = (3 + 2)/10 = 5/10 = 1/2$.

Q2 [F/H · Standard] The probability a player wins a game is 0.3. She plays two independent games. Find the probability she wins exactly once.

Worked solution. Win then lose: $0.3 \times 0.7 = 0.21$. Lose then win: $0.7 \times 0.3 = 0.21$. Total = $0.21 + 0.21 = 0.42$.

Q3 [H · Challenge] A bag has 4 red and 6 blue counters. Two counters are taken without replacement. Find the probability both are red.

Worked solution. $P(\text{first red}) = 4/10$; $P(\text{second red} \mid \text{first red}) = 3/9$. $P(\text{both red}) = 4/10 \times 3/9 = 12/90 = 2/15$.

8. Straight-line and quadratic graphs

Frequency rank 8 of 15 · Strand: Algebra · Typical marks per paper: 4–6 · Priority: high

KEY FACTS & FORMULAS

- $y = mx + c$: m is the gradient, c is the y-intercept.
- Gradient between two points = change in $y \div$ change in x .
- Parallel lines have equal gradients; perpendicular gradients multiply to -1 (Higher).
- Quadratic $y = ax^2 + bx + c$: parabola; roots where $y = 0$; vertex on the line of symmetry $x = -b/(2a)$.
- Read real-world graphs carefully: gradient often means a rate (e.g. speed).

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Write down the gradient and y-intercept of the line $y = 3x - 2$.

Worked solution. Comparing with $y = mx + c$: gradient $m = 3$, y-intercept $c = -2$ (the line crosses the y-axis at $(0, -2)$).

Q2 [F/H · Standard] Find the equation of the straight line through $(1, 4)$ and $(3, 10)$.

Worked solution. Gradient = $(10 - 4)/(3 - 1) = 6/2 = 3$. Using $y = 3x + c$ with $(1, 4)$: $4 = 3 + c$, so $c = 1$. Equation: $y = 3x + 1$. Check with $(3, 10)$: $3(3) + 1 = 10$ ✓

Q3 [H · Challenge] For the graph of $y = x^2 - 4x + 3$, find the coordinates where it crosses the x-axis and the coordinates of the turning point.

Worked solution. Factorise: $(x - 1)(x - 3) = 0$, so it crosses at $(1, 0)$ and $(3, 0)$. Line of symmetry $x = 2$; $y = 4 - 8 + 3 = -1$, so the turning point is $(2, -1)$.

9. Percentage change, compound growth and reverse percentages

Frequency rank 9 of 15 · Strand: Number · Typical marks per paper: 3–6 · Priority: high

KEY FACTS & FORMULAS

- Percentage change: use a multiplier — increase 12% → $\times 1.12$; decrease 12% → $\times 0.88$.
- Compound interest/depreciation: amount = start $\times$ multiplier^{years}. Never work year-by-year if you can use the power.
- Reverse percentage: divide by the multiplier to return to the original (the original is 100%, not the new value).
- Percentage profit/change = $(\text{change} \div \text{original}) \times 100\%$.
- Two successive changes are NOT additive: multiply the multipliers.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Decrease £350 by 12%.

Worked solution. Multiplier = 0.88. $350 \times 0.88 = £308$.

Q2 [F/H · Standard] £2,000 is invested at 4% per year compound interest. Find the value after 3 years, to the nearest penny.

Worked solution. $2000 \times 1.04^3 = 2000 \times 1.124864 = £2,249.73$.

Q3 [H · Challenge] After a 15% increase, a season ticket costs £92. What was the original price?

Worked solution. $92 \div 1.15 = £80$. (Not 92×0.85 — the 15% was added to the original, not to £92.)

10. Standard form

Frequency rank 10 of 15 · Strand: Number · Typical marks per paper: 2–4 · Priority: high

KEY FACTS & FORMULAS

- Standard form: $A \times 10^n$ where $1 \leq A < 10$ and n is an integer.
- Positive n for large numbers, negative n for small numbers.
- Multiply: multiply the A parts, add the powers; then re-normalise if needed.
- Divide: divide the A parts, subtract the powers.
- On calculator papers, use the $\times 10^n$ key rather than typing $\times 10^{\wedge}$ — it avoids bracket errors.

Practice questions — original Apex material, with worked solutions

Q1 [F · Core] Write 45,600 and 0.00032 in standard form.

Worked solution. $45,600 = 4.56 \times 10^4$. $0.00032 = 3.2 \times 10^{-4}$.

Q2 [F/H · Standard] Work out $(3 \times 10^2) \times (2 \times 10^3)$, giving your answer in standard form.

Worked solution. $3 \times 2 = 6$ and $10^2 \times 10^3 = 10^5$, so the answer is 6×10^5 .

Q3 [H · Challenge] Light travels at 3×10^8 m/s. How far does it travel in 200 seconds? Give your answer in standard form.

Worked solution. Distance = speed $\times$ time = $3 \times 10^8 \times 200 = 600 \times 10^8 = 6 \times 10^{11}$ m.

What's next

This is Pack v1, covering the ten highest-frequency topics. The full Apex revision series adds ranks 11–15 and beyond, additional question sets at every difficulty, and board-specific mock papers. Contact Apex Academic Consultancy for tutoring and the complete series.

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